

AWARD/CONTRACT	1. THIS CONTRACT IS A RATED ORDER UNDER DPAS (15 CFR 700)	RATING	PAGE OF PAGES 1 2
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2. CONTRACT (Proc. Inst. Ident.) NO. EP-C-17-031/0006	3. EFFECTIVE DATE See Block 20C	4. REQUISITION/PURCHASE REQUEST/PROJECT NO. PR-ORD-17-01854
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5. ISSUED BY CODE CPOD CPOD US Environmental Protection Agency 26 West Martin Luther King Drive Mail Code: NWD Cincinnati OH 45268	6. ADMINISTERED BY (If other than Item 5) CODE SCD-C
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7. NAME AND ADDRESS OF CONTRACTOR (No., street, country, State and ZIP Code) TETRA TECH, INC. Attn: George Townsend 10306 EATON PL STE 340 FAIRFAX VA 22030	8. DELIVERY <input type="checkbox"/> FOB ORIGIN <input checked="" type="checkbox"/> OTHER (See below) 9. DISCOUNT FOR PROMPT PAYMENT 10. SUBMIT INVOICES (4 copies unless otherwise specified) TO THE ADDRESS SHOWN IN ITEM
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11. SHIP TO/MARK FOR CODE CPOD CPOD US Environmental Protection Agency 26 West Martin Luther King Drive Mail Code: NWD Cincinnati OH 45268	12. PAYMENT WILL BE MADE BY CODE RTP FMC RTP Finance Center US Environmental Protection Agency RTP-Finance Center (AA216-01) 109 TW Alexander Drive www2.epa.gov/financial/contracts Durham NC 27711
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13. AUTHORITY FOR USING OTHER THAN FULL AND OPEN COMPETITION: <input type="checkbox"/> 10 U.S.C. 2304 (c) () <input checked="" type="checkbox"/> 41 U.S.C. 3304 (a) ()	14. ACCOUNTING AND APPROPRIATION DATA See Schedule
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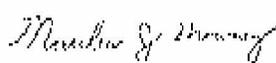
15A. ITEM NO	15B. SUPPLIES/SERVICES	15C. QUANTITY	15D. UNIT	15E. UNIT PRICE	15F. AMOUNT
Continued					

15G. TOTAL AMOUNT OF CONTRACT \$60,000.00

16. TABLE OF CONTENTS							
(X)	SEC.	DESCRIPTION	PAGE(S)	(X)	SEC.	DESCRIPTION	PAGE(S)
PART I - THE SCHEDULE				PART II - CONTRACT CLAUSES			
	A	SOLICITATION/CONTRACT FORM			I	CONTRACT CLAUSES	
	B	SUPPLIES OR SERVICES AND PRICES/COSTS		PART III - LIST OF DOCUMENTS, EXHIBITS AND OTHER ATTACH.			
	C	DESCRIPTION/SPECS./WORK STATEMENT			J	LIST OF ATTACHMENTS	
	D	PACKAGING AND MARKING		PART IV - REPRESENTATIONS AND INSTRUCTIONS			
	E	INSPECTION AND ACCEPTANCE			K	REPRESENTATIONS, CERTIFICATIONS AND OTHER STATEMENTS OF OFFERORS	
	F	DELIVERIES OR PERFORMANCE			L	INSTRS., CONDS., AND NOTICES TO OFFERORS	
	G	CONTRACT ADMINISTRATION DATA			M	EVALUATION FACTORS FOR AWARD	
	H	SPECIAL CONTRACT REQUIREMENTS					

CONTRACTING OFFICER WILL COMPLETE ITEM 17 (SEALED-BID OR NEGOTIATED PROCUREMENT) OR 18 (SEALED-BID PROCUREMENT) AS APPLICABLE

17. <input checked="" type="checkbox"/> CONTRACTOR'S NEGOTIATED AGREEMENT (Contractor is required to sign this document and return _____ copies to issuing office.) Contractor agrees to furnish and deliver all items or perform all the services set forth or otherwise identified above and on any continuation sheets for the consideration stated herein. The rights and obligations of the parties to this contract shall be subject to and governed by the following documents: (a) this award/contract, (b) the solicitation, if any, and (c) such provisions, representations, certifications, and specifications, as are attached or incorporated by reference herein. (Attachments are listed herein.)	18. <input type="checkbox"/> SEALED-BID AWARD (Contractor is not required to sign this document.) Your bid on Solicitation Number _____, including the additions or changes made by you which additions or changes are set forth in full above, is hereby accepted as to the items listed above and on any continuation sheets. This award consummates the contract which consists of the following documents: (a) the Government's solicitation and your bid, and (b) this award/contract. No further contractual document is necessary. (Block 18 should be checked only when awarding a sealed-bid contract.)
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19A. NAME AND TITLE OF SIGNER (Type or print)	20A. NAME OF CONTRACTING OFFICER Matthew Growney
19B. NAME OF CONTRACTOR	20B. UNITED STATES OF AMERICA
BY _____ (Signature of person authorized to sign)	BY  (Signature of the Contracting Officer)
19C. DATE SIGNED	20C. DATE SIGNED 02/01/2018

CONTINUATION SHEET

REFERENCE NO. OF DOCUMENT BEING CONTINUED
EP-C-17-031/0006

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2 2

NAME OF OFFEROR OR CONTRACTOR
TETRA TECH, INC.

ITEM NO. (A)	SUPPLIES/SERVICES (B)	QUANTITY (C)	UNIT (D)	UNIT PRICE (E)	AMOUNT (F)
0001	<p>DUNS Number: 198549560 Time and Material Support for Field Based Assessment Research Task Order TOCOR: Susan Cormier Delivery: 02/06/2019 Accounting Info: 17-18-C-262W000-201FK7-2532-26A5C-17262WC744-001 BFY: 17 EFY: 18 Fund: C Budget Org: 262W000 Program (PRC): 201FK7 Budget (BOC): 2532 Cost: 26A5C DCN - Line ID: 17262WC744-001 FOB: Destination Period of Performance: 02/07/2018 to 02/06/2019</p> <p>Task Order Issuance Line Item: Technical Support for EPA/ORD/NCEA's Ecological Assessment Programs</p> <p>TOCOR: Susan Cormier/513-569-7995/cormier.Susan@epa.gov ALTOCOR: Michael Griffith/513-569-7034/griffith.michael@epa.gov</p>				60,000.00

PERFORMANCE WORK STATEMENT

TetraTech, Inc.
Contract EP-C-17-031
PR-ORD-17-01854

TITLE: Support for Field-based Assessment Research

Task Order Contracting Officer Representative (TOCOR) Name: Susan Cormier, Ph.D. Office: ORD, NCEA, USEPA 26 W. M. L. King Drive Cincinnati, OH 45268 Phone: 513-569-7034 (voice) FAX: 513-569-2540 (fax) Email: cormier.susan@epa.gov (email)	Alternate Task Order Contracting Officer Representative (Alt.TOCOR) Name: Michael Griffith, Ph.D. Office: ORD, NCEA, USEPA 26 W. M. L. King Drive Cincinnati, OH 45268 Phone: 513-569-7034 (voice) Email: Griffith.michael@epa.gov
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PERIOD OF PERFORMANCE: Date of award through 12 months following award

PURPOSE OF TASK ORDER

The first objective of this task order is to develop new methods for estimating background and understanding how background affects, how watersheds respond to natural and man-made influences. The success of this effort will be based on the ability of EPA personnel to understand and repeat the analyses using the open source program R and Microsoft as described in Task 4 and the crafting of manuscripts and other publically available materials that report the research details of the development process for the field-based methods. Work on these projects began in 2007 and continues to advance the science. Therefore, the second objective of the Task Order is to provide greater transparency and accessibility of the supporting analyses used to produce all methods.

BACKGROUND

The US Environmental Protection Agency’s (EPA) Office of Research and Development (ORD), National Center for Environmental Assessment-Cincinnati (NCEA) provides methods and examples for discerning how pollutants may impact our health and the environment. This information is used by states, tribes, businesses, non-government agencies, EPA's program and regional office managers who use the information for making planning, regulatory, enforcement, and remedial-action decisions. NCEA EPA is committed to developing methods using field observations and models to enable decision making to adapt to changes in water quantity and quality. To fulfill this mission, NCEA requires the expertise and support as described in the contract Performance Work Statement (PWS).

Water quality and quantity is affected by natural and man-made situations, such as, hydrologic permanence affected by drought or water removal, land-cover alteration by fire or city building, and loadings by weathering or waste discharges. The more we understand the processes that

affect water quality and quantity, the better positioned we are to minimize or adapt to changing conditions and societal needs. This Task Order supports work to estimate natural background water quality and quantity. It also supports research to characterize causal relationships between sources of change and changes to water quality and quantity. These causal relationships may be used to evaluate stream condition, to assess agents and sources, to predict changing conditions, and to evaluate how decisions have or have not influenced water quality and quantity.

QUALITY ASSURANCE

The tasks in this Task Order require the use of existing data and use of modeling tools for data analysis. The Contractor shall prepare a Quality Assurance Project Plan (QAPP). All QA activities shall be in conformance with this QAPP. Documentation of all analyses shall also indicate how types, quantity, and quality of data have been quality assured and maintained. In addition, the contractor shall ensure that metadata is compiled in an easy to use format. All products should be detailed so that the decisions and analysis are completely transparent to a third party. The Contractor shall alert the TOCOR regarding any quality issues should they arise. Any project specific quality assurance issues shall be reported in the monthly progress reports as specified under Task 1. The QA activities for this Task Order should comprise at least 10% of the total effort.

SCOPE OF WORK

The purpose of this Task Order is to obtain contractor services to address new or modified analyses to advance the use of field data for developing stressor response models and support tools to enable states, tribes and other assessors to readily use these methods. The specific tasks are defined below. Written Technical direction will be provided to the contractor for clarification purposes provided by the EPA TOCOR. Any verbal technical direction shall be provided to the CL-COR/CO in writing within 3 days.

Task 1: Establish Communication and Prepare Work Plan

The Contractor shall establish communication with the EPA TOCOR and develop a regular reporting schedule. The Contractor shall contact the EPA TOCOR and schedule a kickoff project meeting. In collaboration with the EPA TOCOR the Contractor shall also establish a schedule for regular progress reports, project meetings, and other communications throughout the period of performance of this Task Order. Topics of discussion will include roles and responsibilities, points of contact and documentation protocols, timelines, QAPP, milestones and deliverables, and other Task Order administrative activities.

This task requires coordination with other federal agencies and therefore it is particularly important that the Contractor shall notify the EPA TOCOR of issues, problems, questions, or delays as soon as they become apparent or if they are anticipated. The EPA TOCOR may modify the frequency of conference call calls based on project progress. From EPA TOCOR time to time, researchers from other federal agencies may be invited by the EPA TOCOR to provide perspectives and information.

Task 1. Deliverables

1.1	Brief, written progress reports as email to the EPA TOCOR	Due monthly or upon request by the EPA TOCOR for the duration of this Task Order.
1.2	Project meetings and other communications, such as conference calls	Due upon request by the EPA TOCOR for the duration of this Task Order.

Task 2: Prepare and Implement QAPP

The Contractor shall prepare a QAPP and ensure that all products developed under this Task Order are quality assured. A statement about the QAPP should be included in the contractor’s proposal. All work conducted under this Task Order shall be performed pursuant to an EPA approved QAPP. The Contractor shall develop a QAPP within 30 days after TO award for review and approval by the EPA TOCOR and the EPA QA Manager. The QAPP shall outline the approach and measures the Contractor will implement to ensure a high standard of quality in data analysis and written deliverables. The Contractor shall not proceed with tasks needing QA review until the EPA TOCOR furnishes the Contractor, in writing, a notice that the QAPP has been accepted by EPA.

All QA activities shall be in conformance with EPA’s *Requirements for Quality Assurance Project Plans* (EPA QA/R-5) “<https://www.epa.gov/quality/guidance-quality-assurance-project-plans-epa-qag-5>” and should demonstrate a clear understanding of the project’s goals/objectives/questions and issues. Documentation of all analyses shall also indicate how types, quantity, and quality of data have been quality assured and maintained. In particular, the quality assurance shall also ensure that metadata is compiled in an easy to use format accessible to EPA as described in Tasks 3 and 4. All products should be detailed so that the decisions and analysis are completely transparent to a third party. The Contractor shall alert the TOCOR regarding any quality issues should they arise.

Task 2. Deliverables

2.1	A draft QAPP submitted to the EPA TOCOR and QA Manager for review.	Due 4 weeks after Task Order award
2.2	A revised QAPP addressing EPA TOCOR comments on the draft submitted to the EPA TOCOR for approval.	Due 1 week after EPA TOCOR approval of Advanced Statistical Analyses for Deliverable 2.1

Task 3: Develop methods and analyze case examples

The contractor shall develop and refine methods to support field-based methods for condition, causal, predictive and outcome assessments. The contractor shall also use case examples to characterize the confidence and uncertainties in predictions using these developed methods and models. Due to the true research nature that will be performed under this Task Order, EPA TOCOR may request additional analyses or modifications of existing analyses per Technical Directives (TD) and TOCOR direction. The specific analyses to be performed are dependent on the status of completion of work of WA4-19, Contract EP-C-12-060 which end on September 30, 2017. The TOCOR will describe needed tasks at the kick-off meeting and follow with a written summary of the status of the project and TD as needed and as described in Tasks 3.1 and 3.2.

It is anticipated that work will include methods to assess stream water quality and quantity at the reach scale. It is also expected that detailed examples of water quality, quantity, and biological effects will be performed at the watershed scale.

The contractor shall prepare scientific products appropriate for each product. These may include but are not limited to power point presentations, manuscripts, reports, HTML web material, R-code modules, Excel modules, data sets and metadata for publication, data dictionaries, CADDIS website updates, ESRI Story Maps, and GitHub ready code and data sets.

The EPA TOCOR will provide the contractor with previously developed data sets, models for predicting background specific conductivity and for predicting loss of species with a change in water quality. The contractor may be required to obtain additional data from third party sources such as state or federal entities.

Task 3.1: Statistical analyses, Database construction, Report sections (Basic)

These include routine activities such as: writing up methods, performing QA check on databases, obtaining databases, querying data bases, and frequentist analyses such as but not limited to descriptive statistics (e.g., mean, median, centiles, etc.), correlation analysis, box plots, contingency tables, and analyses such as conversion of units, and running regression models. These activities take between 1 to 8 hours. About 30 basic analyses are anticipated for Task 3.1 and will be initiated by written technical directives from the TOCOR.

Task 3.1 Deliverables

3.1	Description of proposed analytical method for each TD		Within 5 business days after completion of analyses
3.2	Interim analytical results		Usually within 5 business days
3.3	Description of methods, data sets and all product outputs		Within 20 business days of completion of analysis

Task 3.2: Complex statistical analyses, spatial analysis, model development (Advanced)

These activities require more sophisticated skills and synthesis of disparate information. The verification of analyses and validation of models adds complexity that increases time needed to

perform the work. These activities are expected to take between 1 to 10 days. The QA and metadata pedigree (Task 4) should include the basic analyses that led to or contributed to the more complex analysis, see Task 3.1. This will reduce redundancy of reporting data sources, R-code and related scientific work. About 7 advanced analyses are expected for Task 3.2 and will be initiated by written technical directives from the TOCOR.

Task 3.2 Deliverables

3.2.1	Description of proposed analytical method for each TD		Within 5 business days after completion of analyses
3.2.2	Interim analytical results		Usually within 20 business days, but may be longer for very complex analyses or models
3.2.3	Description of methods, data sets and all product outputs		Within 20 business days of completion of analysis

Task 4: Provide Metadata

The Contractor shall provide complete metadata for all manipulations of datasets, documentation of all figures, tables, and analyses performed in conjunction with the development of the reports including all appendices, and supporting analyses such as validation of models and predicted values. Datasets and corresponding data dictionaries used for all the analyses shall be provided as flat files (e.g., tab, or comma-delimited) as well as a data dictionary. Files shall be sorted into logical folders such as R-codes, Arc-GIS codes, excel work sheets, data sets, figures, tables, text and all other materials related to the generation of maps, statistical analysis and numeric outputs, etc. The metadata will be linked to a table of contents. The open source R-code shall be split into separate preprocessing and analytic functions. The EPA TOCOR will provide the Contractor with completed data pedigree to use as an example.

The Contractor shall use the open source software "R" for statistical analyses unless otherwise specified with concurrence from the EPA TOCOR. Annotated code and data sets should be retained and submitted when providing results. Results and figures should be provided as code for the statistical package language that was used and provided as ppt, pdf, eps or other image software approved by the EPA TOCOR. Formulae for fitted lines should be provided. All final images should be a minimum of 300 dpi, whereas figures for publication should be 500 dpi.

Any spatial analysis, that is, the use of Geographic Information System (GIS) tools, functions, geoprocessing, and operations (e.g. map overlay, spatial query) of geographically-referenced data, shall include either a flow chart or model-builder steps that depict the data management and analysis of the GIS layers. If any scripts are used in the GIS analysis, those scripts should be annotated, retained, and submitted when providing results. Any maps produced from a GIS system shall include the source information of the data shown in the map and map projection, which may be in Adobe PDF files or ESRI format as dictated by technical direction. FGDC-

compliant metadata will be developed for any newly developed GIS datasets for use with this tool.

After the construction of the metadata pedigree, the Contractor shall test the final product by having non-development personnel rerun all scripts.

Task 4. Deliverables

4.1	Metadata of analyses	Within 30 business days after completion of analyses
4.2	Complete QA and metadata pedigree	At the completion of Task 3.2

Technical Expertise Required for Key Contractor Staff:

The key technical individual(s) must have experience with development of physical, chemical and aquatic life exposure-response relationships. This requires biostatistics (particularly R and writing and reviewing code), water chemistry as it relates to non-conventional pollutants and effects on aquatic life, and the relevant body of literature.

Deliverables and Schedule

<i>Task 1. Communication Deliverables</i>		
1.1	Brief, written progress reports as email to the EPA TOCOR	Due monthly or upon request by the EPA TOCOR for the duration of this Task Order.
1.2	Project meetings and other communications, such as conference calls,	Due upon request by the EPA TOCOR for the duration of this Task Order.
<i>Task 2. QA Deliverables</i>		
2.1	Draft QAPP submitted to the EPA TOCOR and QA Manager for review.	Due 4 weeks after Task Order award
2.2	Revised QAPP addressing EPA TOCOR comments on the draft submitted to the EPA TOCOR for approval.	Due 1 week after EPA TOCOR approval of Deliverable 2.1.
<i>Task 3.1. Analytical Deliverables (25 Basic)</i>		
3.1.1	Description of proposed analytical method for each TD	Within 5 business days after completion of analyses
3.1.2	Interim analytical results	Usually within 5 business days
3.1.3	Description of methods, data sets and all product outputs	Within 20 business days of completion of analysis
<i>Task 3.2. Analytical Deliverables (10 Advanced)</i>		
3.2.1	Description of proposed analytical method for each TD	Within 5 business days after completion of analyses

3.2.2	Interim analytical results		Usually within 20 business days, but may be longer for very complex analyses or models
3.2.3	Description of methods, data sets and all product outputs		Within 20 business days of completion of analysis
<i>Task 4. Documentation Deliverables</i>			
4.1	Metadata of analyses		Due within 30 business days after completion of analyses
4.2	Complete QA and metadata pedigree		Due at the completion of Task 3.2

ACCEPTANCE CRITERIA

The Contractor shall prepare high quality products and that are reproducible and transparent. Figures submitted shall be of high quality similar to presentations developed for national scientific forums and should be formatted as jpeg or TIFF files. Text deliverables shall be provided in Microsoft Word 2010 or compatible format.

2. AMENDMENT/MODIFICATION NO. 001	3. EFFECTIVE DATE See Block 16C	4. REQUISITION/PURCHASE REQ. NO. PR-ORD-18-00892	5. PROJECT NO. (If applicable) EP-C-17-031
6. ISSUED BY CODE CPOD		7. ADMINISTERED BY (If other than Item 6) CODE	
CPOD US Environmental Protection Agency 26 West Martin Luther King Drive Mail Code: NWD Cincinnati OH 45268			

8. NAME AND ADDRESS OF CONTRACTOR (No., street, county, State and ZIP Code) TETRA TECH, INC. Attn: George Townsend 10306 EATON PL STE 340 FAIRFAX VA 22030	(x)	9A. AMENDMENT OF SOLICITATION NO.
		9B. DATED (SEE ITEM 11)
	x	10A. MODIFICATION OF CONTRACT/ORDER NO. EP-C-17-031 0006
		10B. DATED (SEE ITEM 13) 02/01/2018
CODE 198549560	FACILITY CODE	

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers is extended. is not extended.
Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods: (a) By completing Items 8 and 15, and returning _____ copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGEMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required) See Schedule	Net Increase:	\$30,000.00
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13. THIS ITEM ONLY APPLIES TO MODIFICATION OF CONTRACTS/ORDERS. IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

CHECK ONE	A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.
	B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).
	C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:
X	D. OTHER (Specify type of modification and authority) UNILATERAL - LIMITATION OF FUNDS, CONTRACT ADMINISTRATION

E. IMPORTANT: Contractor is not. is required to sign this document and return _____ copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

DUNS Number: 198549560

Time and Material Support for Field Based Assessment Research Task Order

TOCOR: Susan Cormier

LIST OF CHANGES:

Reason for Modification : Supplemental Agreement for work within scope (see Attachment 1: Amend 1 PWS) and additional funding.

Total Amount for this Modification: \$30,000.00

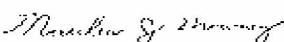
New Total Amount for this Version: \$90,000.00

New Total Amount for this Award: \$90,000.00

Obligated Amount for this Modification: \$30,000.00

Continued ...

Except as provided herein, all terms and conditions of the document referenced in Item 9 A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)	16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print) Matthew Growney
15B. CONTRACTOR/OFFEROR	16B. UNITED STATES OF AMERICA
(Signature of person authorized to sign)	 (Signature of Contracting Officer)
15C. DATE SIGNED	16C. DATE SIGNED 03/27/2018
	ELECTRONIC SIGNATURE

CONTINUATION SHEET

REFERENCE NO. OF DOCUMENT BEING CONTINUED
EP-C-17-031/0006/001

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NAME OF OFFEROR OR CONTRACTOR
TETRA TECH, INC.

ITEM NO. (A)	SUPPLIES/SERVICES (B)	QUANTITY (C)	UNIT (D)	UNIT PRICE (E)	AMOUNT (F)
	<p>New Total Obligated Amount for this Award: \$90,000.00</p> <p>CHANGES FOR LINE ITEM NUMBER: 1 Total Amount changed from \$60,000.00 to \$90,000.00 Obligated Amount for this modification: \$30,000.00</p> <p>NEW ACCOUNTING CODE ADDED: Account code: 18-19-C-262W000-000FK7XR3-2532-26A5C-18262WC801-001 1 Beginning FiscalYear 18 Ending Fiscal Year 19 Fund (Appropriation) C Budget Organization 262W000 Program (PRC) 000FK7XR3 Budget (BOC) 2532 Job # (Site/Project) Cost Organization 26A5C DCN-LineID 18262WC801-001 Amount: \$30,000.00 Percent: 50 Subject To Funding: N Delivery: 02/06/2019 Delivery Location Code: CPOD CPOD US Environmental Protection Agency 26 West Martin Luther King Drive Mail Code: NWD Cincinnati OH 45268 USA</p> <p>Payment: RTP Finance Center US Environmental Protection Agency RTP-Finance Center (AA216-01) 109 TW Alexander Drive www2.epa.gov/financial/contracts Durham NC 27711</p> <p>FOB: Destination Period of Performance: 02/07/2018 to 02/06/2019 TOCOR: Susan Cormier/513-569-7995/cormier.Susan@epa.gov ALTOCOR: Michael Griffith/513-569-7034/griffith.michael@epa.gov</p>				

PERFORMANCE WORK STATEMENT: Amendment 1

TetraTech, Inc.
Contract EP-C-17-031
Task Order 6

TITLE: Support for Field-based Assessment Research

Task Order Contracting Officer Representative (TOCOR) Name: Susan Cormier, Ph.D. Office: ORD, NCEA, USEPA 26 W. M. L. King Drive Cincinnati, OH 45268 Phone: 513-569-7034 (voice) FAX: 513-569-2540 (fax) Email: cormier.susan@epa.gov (email)	Alternate Task Order Contracting Officer Representative (Alt.TOCOR) Name: Michael Griffith, Ph.D. Office: ORD, NCEA, USEPA 26 W. M. L. King Drive Cincinnati, OH 45268 Phone: 513-569-7034 (voice) Email: Griffith.michael@epa.gov
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PERIOD OF PERFORMANCE 2/7/18 – 2/6/19

PURPOSE OF TASK ORDER

The first objective of this task order is to develop new methods for estimating background and understanding how background affects, how watersheds respond to natural and man-made influences. The success of this effort will be based on the ability of EPA personnel to understand and repeat the analyses using the open source program R and Microsoft as described in Task 4 and the crafting of manuscripts and other publically available materials that report the research details of the development process for the field-based methods. Work on these projects began in 2007 and continues to advance the science. Therefore, the second objective of the Task Order is to provide greater transparency and accessibility of the supporting analyses used to produce all methods.

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This task requires coordination with other federal agencies and therefore it is particularly important that the Contractor shall notify the EPA TOCOR of issues, problems, questions, or delays as soon as they become apparent or if they are anticipated. The EPA TOCOR may modify the frequency of conference call calls based on project progress. From EPA TOCOR time to time, researchers from other federal agencies may be invited by the EPA TOCOR to provide perspectives and information.

Task 1. Deliverables

1.1	Brief, written progress reports as email to the EPA TOCOR		Due monthly or upon request by the EPA TOCOR for the duration of this Task Order.
1.2	Project meetings and other communications, such as conference calls		Due upon request by the EPA TOCOR for the duration of this Task Order.

Task 2: Prepare and Implement QAPP

The Contractor shall prepare a QAPP and ensure that all products developed under this Task Order are quality assured. A statement about the QAPP should be included in the contractor’s proposal. All work conducted under this Task Order shall be performed pursuant to an EPA approved QAPP. The Contractor shall develop a QAPP within 30 days after TO award for review and approval by the EPA TOCOR and the EPA QA Manager. The QAPP shall outline the approach and measures the Contractor will implement to ensure a high standard of quality in data analysis and written deliverables. The Contractor shall not proceed with tasks needing QA review until the EPA TOCOR furnishes the Contractor, in writing, a notice that the QAPP has been accepted by EPA.

All QA activities shall be in conformance with EPA’s *Requirements for Quality Assurance Project Plans* (EPA QA/R-5) “<https://www.epa.gov/quality/guidance-quality-assurance-project-plansepa-qag-5>” and should demonstrate a clear understanding of the project’s goals/objectives/questions and issues. Documentation of all analyses shall also indicate how types, quantity, and quality of data have been quality assured and maintained. In particular, the quality assurance shall also ensure that metadata is compiled in an easy to use format accessible to EPA as described in Tasks 3 and 4. All products should be detailed so that the decisions and analysis are completely transparent to a third party. The Contractor shall alert the TOCOR regarding any quality issues should they arise.

Task 2. Deliverables

2.1	A draft QAPP submitted to the EPA TOCOR and QA Manager for review.		Due 4 weeks after Task Order award
2.2	A revised QAPP addressing EPA TOCOR comments on the draft submitted to the EPA TOCOR for approval.		Due 1 week after EPA TOCOR approval of Advanced Statistical Analyses for Deliverable 2.1

Task 3: Develop methods and analyze case examples

The contractor shall develop and refine methods to support field-based methods for condition, causal, predictive and outcome assessments. The contractor shall also use case examples to characterize the confidence and uncertainties in predictions using these developed methods and models. Due to the true research nature that will be performed under this Task Order, EPA TOCOR may request additional analyses or modifications of existing analyses per Technical Directives (TD) and TOCOR direction. The specific analyses to be performed are dependent on the status of completion of work of WA4-19, Contract EP-C-12-060 which end on September 30, 2017. The TOCOR will describe needed tasks at the kick-off meeting and follow with a written summary of the status of the project and TD as needed and as described in Tasks 3.1 and 3.2.

It is anticipated that work will include methods to assess stream water quality and quantity at the reach scale. It is also expected that detailed examples of water quality, quantity, and biological effects will be performed at the watershed scale.

The contractor shall prepare scientific products appropriate for each product. These may include but are not limited to power point presentations, manuscripts, reports, HTML web material, R-code modules, Excel modules, data sets and metadata for publication, data dictionaries, CADDIS website updates, ESRI Story Maps, and GitHub ready code and data sets.

The EPA TOCOR will provide the contractor with previously developed data sets, models for predicting background specific conductivity and for predicting loss of species with a change in water quality. The contractor may be required to obtain additional data from third party sources such as state or federal entities.

Task 3.1: Statistical analyses, Database construction, Report sections (Basic) These include routine activities such as: writing up methods, performing QA check on databases, obtaining databases, querying data bases, and frequentist analyses such as but not limited to descriptive statistics (e.g., mean, median, centiles, etc.), correlation analysis, box plots, contingency tables, and analyses such as conversion of units, and running regression models. These activities take

between 1 to 8 hours. About 30 basic analyses are anticipated for Task 3.1 and will be initiated by written technical directives from the TOCOR. Amendment 1 adds 6 more basic analyses.

Task 3.1 Deliverables

3.1	Description of proposed analytical method for each TD		Within 5 business days after completion of analyses
3.2	Interim analytical results		Usually within 5 business days
3.3	Description of methods, data sets and all product outputs		Within 20 business days of completion of analysis

Task 3.2: Complex statistical analyses, spatial analysis, model development (Advanced) These activities require more sophisticated skills and synthesis of disparate information. The verification of analyses and validation of models adds complexity that increases time needed to perform the work. These activities are expected to take between 1 to 10 days. The QA and metadata pedigree (Task 4) should include the basic analyses that led to or contributed to the more complex analysis, see Task 3.1. This will reduce redundancy of reporting data sources, R-code and related scientific work. About 7 advanced analyses are expected for Task 3.2 and will be initiated by written technical directives from the TOCOR. Amendment 1 adds 4 more advanced analyses.

Task 3.2 Deliverables

3.2.1	Description of proposed analytical method for each TD		Within 5 business days after completion of analyses
3.2.2	Interim analytical results		Usually within 20 business days, but may be longer for very complex analyses or models
3.2.3	Description of methods, data sets and all product outputs		Within 20 business days of completion of analysis

Task 4: Provide Metadata

The Contractor shall provide complete metadata for all manipulations of datasets, documentation of all figures, tables, and analyses performed in conjunction with the development of the reports including all appendices, and supporting analyses such as validation of models and predicted values. Datasets and corresponding data dictionaries used for all the analyses shall be provided as flat files (e.g., tab, or comma-delimited) as well as a data dictionary. Files shall be sorted into logical folders such as R-codes, Arc-GIS codes, excel work sheets, data sets, figures, tables, text and all other materials related to the generation of maps,

statistical analysis and numeric outputs, etc. The metadata will be linked to a table of contents. The open source R-code shall be split into separate preprocessing and analytic functions. The EPA TOCOR will provide the Contractor with completed data pedigree to use as an example.

The Contractor shall use the open source software "R" for statistical analyses unless otherwise specified with concurrence from the EPA TOCOR. Annotated code and data sets should be retained and submitted when providing results. Results and figures should be provided as code for the statistical package language that was used and provided as ppt, pdf, eps or other image software approved by the EPA TOCOR. Formulae for fitted lines should be provided. All final images should be a minimum of 300 dpi, whereas figures for publication should be 500 dpi.

Any spatial analysis, that is, the use of Geographic Information System (GIS) tools, functions, geoprocessing, and operations (e.g. map overlay, spatial query) of geographically-referenced data, shall include either a flow chart or model-builder steps that depict the data management and analysis of the GIS layers. If any scripts are used in the GIS analysis, those scripts should be annotated, retained, and submitted when providing results. Any maps produced from a GIS system shall include the source information of the data shown in the map and map projection, which may be in Adobe PDF files or ESRI format as dictated by technical direction. FGDC compliant metadata will be developed for any newly developed GIS datasets for use with this tool.

After the construction of the metadata pedigree, the Contractor shall test the final product by having non-development personnel rerun all scripts.

Task 4. Deliverables

4.1	Metadata of analyses		Within 30 business days after completion of analyses
4.2	Complete QA and metadata pedigree		At the completion of Task 3.2

Technical Expertise Required for Key Contractor Staff:

The key technical individual(s) must have experience with development of physical, chemical and aquatic life exposure-response relationships. This requires biostatistics (particularly R and writing and reviewing code), water chemistry as it relates to non-conventional pollutants and effects on aquatic life, and the relevant body of literature.

Deliverables and Schedule

<i>Task 1. Communication Deliverables</i>		
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1.1	Brief, written progress reports as email to the EPA TOCOR	Due monthly or upon request by the EPA TOCOR for the duration of this Task Order.
1.2	Project meetings and other communications, such as conference calls,	Due upon request by the EPA TOCOR for the duration of this Task Order.
<i>Task 2. QA Deliverables</i>		
2.1	Draft QAPP submitted to the EPA TOCOR and QA Manager for review.	Due 4 weeks after Task Order award
2.2	Revised QAPP addressing EPA TOCOR comments on the draft submitted to the EPA TOCOR for approval.	Due 1 week after EPA TOCOR approval of Deliverable 2.1.
<i>Task 3.1. Analytical Deliverables (25 Basic)</i>		
3.1.1	Description of proposed analytical method for each TD	Within 5 business days after completion of analyses
3.1.2	Interim analytical results	Usually within 5 business days
3.1.3	Description of methods, data sets and all product outputs	Within 20 business days of completion of analysis
<i>Task 3.2. Analytical Deliverables (10 Advanced)</i>		
3.2.1	Description of proposed analytical method for each TD	Within 5 business days after completion of analyses
3.2.2	Interim analytical results	Usually within 20 business days, but may be longer for very complex analyses or models
3.2.3	Description of methods, data sets and all product outputs	Within 20 business days of completion of analysis
<i>Task 4. Documentation Deliverables</i>		
4.1	Metadata of analyses	Due within 30 business days after completion of analyses
4.2	Complete QA and metadata pedigree	Due at the completion of Task 3.2

ACCEPTANCE CRITERIA

The Contractor shall prepare high quality products and that are reproducible and transparent. Figures submitted shall be of high quality similar to presentations developed for national scientific forums and should be formatted as jpeg or TIFF files. Text deliverables shall be provided in Microsoft Word 2010 or compatible format.

2. AMENDMENT/MODIFICATION NO. P00002	3. EFFECTIVE DATE See Block 16C	4. REQUISITION/PURCHASE REQ. NO. PR-ORD-19-00020	5. PROJECT NO. (If applicable) EP-C-17-031
6. ISSUED BY CAD	CODE CAD	7. ADMINISTERED BY (If other than Item 6)	CODE
CAD US Environmental Protection Agency 26 West Martin Luther King Drive Mail Code: W136 Cincinnati OH 45268-0001			

8. NAME AND ADDRESS OF CONTRACTOR (No., street, county, State and ZIP Code) TETRA TECH, INC. Attn: George Townsend 10306 EATON PL STE 340 FAIRFAX VA 22030	(x)	9A. AMENDMENT OF SOLICITATION NO.
		9B. DATED (SEE ITEM 11)
	x	10A. MODIFICATION OF CONTRACT/ORDER NO. EP-C-17-031 0006
		10B. DATED (SEE ITEM 13) 02/01/2018
CODE 198549560	FACILITY CODE	

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers is extended. is not extended. Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods: (a) By completing Items 8 and 15, and returning _____ copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGEMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)
See Schedule

13. THIS ITEM ONLY APPLIES TO MODIFICATION OF CONTRACTS/ORDERS. IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

CHECK ONE	A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.
	B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).
	C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:
X	D. OTHER (Specify type of modification and authority) Mutual Agreement to Close Out Task Order-NO COST MOD

E. IMPORTANT: Contractor is not. is required to sign this document and return 1 copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)
 DUNS Number: 198549560
 Time and Material Support for Field Based Assessment Research Task Order
 TOCOR: Susan Cormier
 LIST OF CHANGES:
 Reason for Modification: NO COST MOD to close out task order in full based on mutual agreement of both parties.

Contracting Officer changed
from Matthew Growney
to Mark Cranley

Continued ...

Except as provided herein, all terms and conditions of the document referenced in Item 9 A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)	16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print) Mark Cranley
15B. CONTRACTOR/OFFEROR	15C. DATE SIGNED
(Signature of person authorized to sign)	
16B. UNITED STATES OF AMERICA 	16C. DATE SIGNED 11/01/2018
(Signature of Contracting Officer)	ELECTRONIC SIGNATURE

CONTINUATION SHEET

REFERENCE NO. OF DOCUMENT BEING CONTINUED
EP-C-17-031/0006/P00002

PAGE OF
2 2

NAME OF OFFEROR OR CONTRACTOR
TETRA TECH, INC.

ITEM NO. (A)	SUPPLIES/SERVICES (B)	QUANTITY (C)	UNIT (D)	UNIT PRICE (E)	AMOUNT (F)
	Delivery: 02/06/2019 Delivery Location Code: CPOD CPOD US Environmental Protection Agency 26 West Martin Luther King Drive Mail Code: NWD Cincinnati OH 45268 USA Payment: RTP Finance Center US Environmental Protection Agency RTP-Finance Center (AA216-01) 109 TW Alexander Drive www2.epa.gov/financial/contracts Durham NC 27711 Period of Performance: 02/07/2018 to 02/06/2019 TOCOR: Susan Cormier/513-569-7995/cormier.Susan@epa.gov ALTOCOR: Michael Griffith/513-569-7034/griffith.michael@epa.gov				